# UNITED STATES PATENT AND TRADEMARK OFFICE

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/669,624 | 09/24/2003 | John F. Wakerly | 062891.1128 | 5626 |

5073          7590          08/12/2008

BAKER BOTTS L.L.P.
2001 ROSS AVENUE
SUITE 600
DALLAS, TX 75201-2980

| EXAMINER |
|---|
| AVELLINO, JOSEPH E |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2146 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 08/12/2008 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptomail1@bakerbotts.com
glenda.orrantia@bakerbotts.com

PTOL-90A (Rev. 04/07)

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *30 June 2008*.
2a)☐ This action is **FINAL**.        2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,3-20,22-38 and 40-47* is/are pending in the application.
   4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1,3-20,22-38 and 40-47* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a)☐ All   b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
   * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

## DETAILED ACTION

1.      Claims 1, 3-20, 22-38, and 40-47 are presented for examination; claims 1, 20,

29, 38, and 47 independent.  The Office acknowledges the cancellation of claims 2, 21,

and 39

### *Specification*

2.      The specification is objected to as failing to provide proper antecedent basis for

the claimed subject matter.  See 37 CFR 1.75(d)(1) and MPEP § 608.01(o).  Correction

of the following is required: The specification fails to provide antecedent basis for the

term "computer-readable medium".

### *Claim Rejections - 35 USC § 101*

The text of those sections of Title 35, U.S. Code not included in this action can

be found in a prior Office action.

Claims 20, and 22-28 are rejected under 35 U.S.C. 101 because they fail to

establish a statutory category of invention.

Exemplary claim 20 claims a "context manager" which can be implemented

solely as software (see specification, page 21).  As such, it can be reasonably

construed that the context manager as claimed only recites software elements and

therefore is merely a software program.  As such, software, per se fails to establish a

statutory category of invention.  Correction is required.

## *Claim Rejections - 35 USC § 103*

The text of those sections of Title 35, U.S. Code not included in this action can

be found in a prior Office action.

Claims 1, 3-6, 9-11, 13-20, 22-25, 27, 29-33, 35, 37, 38, 40-42, 44, 46 and 47 are

rejected under 35 U.S.C. 103(a) as being unpatentable over Melvin et al. (US

2003/0069920) (hereinafter Melvin) in view of Johnson et al. (USPN 6,684,395)

(hereinafter Johnson) in view of Bunce et al. (USPN 6,836,808) (hereinafter Bunce).

3.      Referring to claim 1, Melvin discloses a system for packet processing, the system

comprising:

a plurality of processors (i.e. tribes) each comprising a processor core and

instruction memory loaded with a code partition (i.e. memory for processing threads),

each of the memories implementing a feature set for packet processing, the processor

core operable to execute the code partition to perform processing of packets and to

generate migration requests for transferring packet processing operations from the

loaded code partition (i.e. tribe to tribe migration of contexts to move threads, which

execute packet processing, from tribe-to-tribe) (e.g. abstract; Figure 1);

a context manager (i.e. arbiter) operable to receive a migration request from one

of the loaded code partitions (i.e. memory) executing within one of the processor cores,

the migration request comprising packet context information (i.e. context register sets)

and identifying a target one of the code partitions (i.e. code executing on a tribe), and in response to the migration request, to determine whether one of the processors having the target code partition loaded is available for processing and, if so, to communicate the packet context to the available one of the processors (i.e. selecting one requester for a non-busy destination, the system will only select the source if the request for migration was received) (¶ 630-632).

Melvin does not disclose a shared memory maintaining a plurality of code partitions, which loads a code partition from the shared memory. In analogous art, Johnson discloses another system for network packet processing (col. 4, lines 1-12) which discloses a shared memory comprising a plurality of code partitions (i.e. threads) which can be loaded into various processor cores (i.e. microengines 14b-14g) (Figures 1 and 5; col. 3, lines 28-49; col. 8, lines 8-28). It would have been obvious to one of ordinary skill in the art to combine Johnson with Melvin by providing an efficient method to load the microcode as described in Johnson into the memory of the tribes of Melvin in order to provide an efficient method to install processing code into a particular processor, thereby reducing complexities with respect to program loading.

Melvin-Johnson do not explicitly disclose that the queues are based on the code partition, rather are directed to the processors themselves. In analogous art, Bunce discloses a plurality of queues $Q_1$-$Q_N$ stored in shared memory 204 which hold tasks for each of a plurality of code partitions (i.e. threads each implementing a subset of packet processing features) (e.g. abstract; Figure 2a; col. 3, line 53 to col. 4, line 4; col. 4, line 51 to col. 5, line 2) (note it is well known that threads are processor independent and

that every thread does not necessarily have to be executing and can be switched out with another thread). It would have been obvious to one of ordinary skill in the art to utilize the processing threads of Bunce in the system of Melvin-Johnson in order to provide redundant background availability for processing of packets in order for one stage to not be a bottleneck for the entire system (Bunce: col. 4, lines 43-50).

4.      Referring to claims 3, Melvin and Bunce discloses placing migration data into a queue associated with a particular code partition (i.e. tribe) and upon determining that one of the processors having the target code partition loaded is available for processing, to communicate the packet context information to the to the available one of the processors (i.e. receive requests from all the different sources and put them into respective FIFOs) (Melvin: ¶ 569-574; Bunce: Figures 2A-3).

5.      Referring to claim 4, Melvin discloses tracking an age for each entry in the queues and to service each of the queues based on the age for each of the entries (i.e. the scheduling function looks at the oldest request in the FIFO and schedules the request into the packet memory) (¶ 583).

6.      Referring to claim 5, Melvin-Johnson discloses the invention as described above. Melvin-Johnson does not expressly disclose the age identifies a time when a packet corresponding to the entry was received by the system, however this is well known in queuing systems. By this rationale, "Official Notice" is taken that both the concepts and

advantages of tracking a time when a packet corresponding to reception by the system

is well known and expected in the art.  It would have been obvious to one of ordinary

skill in the art to modify the system of Melvin-Johnson to include a timestamp to the

packet in the FIFO in order to provide an efficient method to track each packet with

respect to one another to ensure that oldest packets get out first, thereby ensuring

proper throughput for the system.


7.      Referring to claim 6, Melvin-Johnson discloses the invention as described in the

claims above.  Melvin-Johnson do not expressly disclose bypassing the queue when the

queue is empty, however this is well known and expected in processing systems.  By

this rationale, "Official Notice" is taken that both the concepts and advantages of

providing for queue bypass is well known and expected in the art.  It would have been

obvious to one of ordinary skill in the art to modify the system of Melvin-Johnson in

order to reduce overhead processing by removing the added step queuing a packet only

to dequeue the packet immediately, resulting in wasted clock cycles.


8.      Referring to claim 9, the packet context information comprises a stack pointer

that indicates a portion in the shared memory (i.e. migrating a thread from one tribe to

another by moving the program counter and a portion of the context registers to

registers of the second one of the tribes) (¶ 8).

9.      Referring to claim 10, Melvin-Johnson do not expressly disclose storing context

data in a shared memory before issuing a migration request, however this is well known

in the art as a feature of "process migration". By this rationale, "Official Notice" is taken

that both the concepts and advantages of storing context data in a shared memory for

access by another process is well known and expected in the art. It would have been

obvious to one of ordinary skill in the art to modify the system of Melvin-Johnson to

include process migration context storage in shared memory in order to provide an

efficient method to distribute context information to particular elements.

10.     Referring to claim 11, Melvin-Johnson discloses a first interconnect coupling the

shared memory and the processors (Johnson: Figure 1, ref. 42) and a second

interconnect coupling the processors and the context manager providing a dedicated

link for transferring at least a portion of the packet processing information between the

partitions operating on the processors (Melvin: Figure 1: ref. 109).

11.     Referring to claims 13-15, Melvin discloses identifying an entry point using a

program-counter offset from the beginning of the targeted code partition using an index

into a table entry (i.e. transfer a program counter to a particular tribe) (see rejection

above).

12.     Referring to claims 16 and 17 Melvin-Johnson discloses the invention as

described above. Melvin-Johnson do not explicitly state that at least one of the code

portions is not installed in memory, and the context manager is further operable to

receive a request for a code partition not loaded, and then initiate loading the code

partition into the instruction memory, however this is a well known part of multiprocessor

coding (i.e. pages of instructions loaded into a microprocessor). Furthermore if the

microcode code object 116 of Johnson includes a plurality of images 120, that was in

excess of the number of microengines 14, then the core processor would be required to

swap out/in various images to execute particular parts of the program. Furthermore still,

Bunce discloses a plurality of threads inherently executed by a processor. These

threads would inherently be switched out (i.e. context switching) in order to permit the

threads to obtain equal time if the number of threads is greater than the number of

processors (see rejections above). By this rationale, "Official Notice" is taken that both

the concepts and advantages of providing for a code partition not loaded into processor

memory, and when referenced, would be loaded into a particular processor instruction

memory. It would have been obvious to one of ordinary skill to modify the system of

Melvin-Johnson-Bunce to provide multiple pages not in memory and to load them in

when called in order to provide flexibility in assembling microcode code objects, and not

having them rigidly set in the number of pages allocated, resulting in a flexible length

program set.


13.     Referring to claim 18, Johnson discloses a page of instructions and load code

partitions using a paging scheme (Figure 8).

14.    Referring to claim 19, Melvin discloses executing a plurality of processing

threads operable to separately perform processing of packets using a loaded one of the

code partitions (i.e. memory blocks) (e.g. abstract).

15.    Claims 20, 22-25, 27, 29-33, 35, 37, 38, 40-42, 44, 46 and 47 are rejected for

similar reasons as stated above.

Claims 7, 8, 12, 26, 28, 34, 36, 45 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Melvin-Johnson-Bunce as applied above in view of Alam (USPN

7,340,535).

16.    Referring to claims 7 and 8, Melvin-Johnson-Bunce discloses the invention as

described above.  Melvin-Johnson-Bunce do not explicitly disclose an initial code

partition identifies a plurality of processing functions, and includes a migration

instruction associated with the processing function which indicates another one of the

partitions, rather Melvin just discloses a thread migration instruction NEXT, not anything

regarding how the thread knows which tribe to go to next (¶ 89-92).  IN analogous art,

Alam discloses another packet processing system which discloses a Packet Forwarding

Engine Driver which learns about the packet functions needed for the particular flow,

and generating a data structure to direct how the ingress and egress controllers are to

handle the particular packets of the flow (cols. 6-8).  It would have been obvious to one

of ordinary skill in the art to combine the PFE driver details of Alam into the packet

buffer module of Melvin-Johnson-Bunce, thereby allowing the packet buffer module to

determine which tribes need to process the packets and which migration instructions

need to be inserted into the threads, in order to realize the benefits described in Alam in

the system of Melvin-Johnson-Bunce, specifically the ability to efficiently control routing

of network data that provides efficient configuration of routing functionality and that

optimizes the use of available resources (Alam: col. 2, lines 10-15).

17.     Referring to claim 12, Melvin-Johnson-Bunce discloses the invention as

described in the claims above.  Melvin-Johnson-Bunce does not disclose detecting

unbalanced operation and reassign code partitions to rebalance delays, rather assign

tasks to various processing threads.  In analogous art, Alam discloses a plurality of

virtual service engines which are reconfigurable and provide resources which can be

reconfigured to meet the needs of the system (col. 4, lines 23-33).  It would have been

obvious to one of ordinary skill in the art to combine Alam with Melvin-Johnson-Bunce in

order efficiently control routing of network data that provides efficient configuration of

routing functionality and that optimizes the use of available resources (Alam: col. 2,

lines 10-15).

18.     Claims 26, 28, 34, 36, 45 are rejected for similar reasons as stated above.

## *Response to Arguments*

19.     Applicant's arguments dated June 30, 2008 have been fully considered but are

not persuasive.


20.     Applicant argues, in substance, that the Examiner's assertions of what is prior art

is improper.  The Examiner disagrees.  It appears Applicant is attempting to traverse the

Examiner's assertions of Official Notice as used in the previous Office Action, however

this traversal is deficient.  MPEP 2144.03 states that:

> To adequately traverse such a finding, an applicant must specifically point
>
> out the supposed errors in the examiner's action, which would include
>
> stating why the noticed fact is not considered to be common knowledge or
>
> well-known in the art. See 37 CFR 1.111(b). See also Chevenard, 139
>
> F.2d at 713, 60 USPQ at 241 ("[I]n the absence of any demand by
>
> appellant for the examiner to produce authority for his statement, we will
>
> not consider this contention."). A general allegation that the claims define
>
> a patentable invention without any reference to the examiner's assertion of
>
> official notice would be inadequate

As such, Applicant's traversal is deficient and therefore will not be considered.

By this rationale, the rejections are maintained.


21.     Applicant argues, in substance, that claims 20-28 are statutory under 35 USC

101.  The Examiner disagrees.  As stated earlier, the whole of claim 20 <u>can</u> be

implemented as software alone.  A broad consideration has been taken when

interpreting the claims for statutory embodiments.  If a claim recites that it may be

implemented solely as software, then it <u>can</u> be implemented as software, and therefore covers non-statutory embodiments.  As such, since the context manager as claimed covers non-statutory embodiments of the invention (i.e. software alone), the claims are non-statutory and therefore the rejection is maintained.

22.     Applicant's other arguments are moot in view of the new rejections presented above.

### *Conclusion*

23.     The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph E. Avellino whose telephone number is (571) 272-3905.  The examiner can normally be reached on Monday-Friday 7:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey C. Pwu can be reached on (571)272-6798.  The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


/Joseph E. Avellino/
Primary Examiner, Art Unit 2146